PREVALENCE AND FACTORS ASSOCIATED WITH COMMUNITY-ACQUIRED PNEUMONIA AMONG UNDER-FIVES ADMITTED AT KIRYANDONGO GENERAL HOSPITAL

BY

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DECLARATION

I, **Adongakulu Emma Bongani**, do declare that this research work titled "Prevalence and Factors Associated with Community-Acquired Pneumonia among Under-fives Admitted at Kiryandongo General Hospital" is my own and has not been produced or submitted to any Institution for any purpose whatsoever neither for the award of bachelor of Medicine and bachelor of Surgery. The whole work is original; all references have been acknowledged.

Signature …… Date …….

ADONGAKULU EMMA BONGANI

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APPROVAL

This research dissertation entitled; “Prevalence and Factors Associated with Community-Acquired Pneumonia among Under-fives Admitted at Kiryandongo General Hospital” has been prepared under my close supervision and is therefore approved for submission to Faculty of Clinical Medicine and Dentistry of Kampala International University in partial fulfillment for the award of Bachelor of Medicine and Bachelors of Surgery.

Signature ……. Date ……

SUPERVISOR: Mr. Ayikobua Tiyo Emmanuel, Medical Laboratory (BSc), Medical Physiology (MSc).

DEDICATION

I dedicate this research work to my family, who have always been there to ensure that all that I do is fruitful.

ACKNOWLEDGEMENT

I would like to thank the Almighty God for the gift of life, both to my family members and me. I would also like to acknowledge my supervisor, **Mr. Ayikobua Tiyo Emmanuel**, whose scholarly advice, help, constant encouragement and support have contributed significantly to my study. To all KIU staff, both teaching and non-teaching, and all those who in one way or the other contributed to my academic endeavors, I say a big thank you.

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LIST OF ABBREVIATIONS

AIDS	**:**	Acquired Immuno-Deficiency Disease
CAP	**:**	Community-Acquired Pneumonia
CDC	**:**	Centers for Disease Control and Prevention
CHD	**:**	Congenital Heart Disease
eMTCT	**:**	Elimination of Mother to Child Transmission of HIV/AIDS
EPIC	**:**	Etiology of Pneumonia in the Community
HIV	**:**	Human Immuno-Deficiency Virus
IREC	**:**	Institutional Research and Ethics Committee
KGH	:	Kiryandongo General Hospital
KIU	**:**	Kampala International University
MCEE	**:**	Maternal and Child Epidemiology Estimation Group
MDGs	**:**	Millennium Development Goals
UNICEF	**:**	United Nations Children's Fund
USA	**:**	United States of America
UBOS	**:**	Uganda Bureau of Statistics
WHO	**:**	World Health Organization

OPERATIONAL DEFINITIONS

Under-fives **:** Children between the ages of 0 – 59 months.

Community Acquired Pneumonia **:** Pneumonia contracted by a person with little contact with the healthcare system.

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ABSTRACT

Background: Pneumonia is the leading cause of mortality in children under five years. Many predisposing factors do exist and can be avoided to reduce its prevalence in Uganda, and Kiryandongo where data is scarce concerning this subject.

Method: a descriptive questionnaire-based cross-sectional study that involved a total of 220 under-fives admitted at Kiryandongo General Hospital that set out to determine the prevalence and factors associated with community-acquired pneumonia was conducted.

Results: The prevalence of community-acquired pneumonia was 15.91% with child's sex, immunization history, breastfeeding history and residence being found statistically significant whereas child's age insignificant. Other factors were exposure to pollutants, exposure to cold, malnutrition and HIV/AIDS coinfection.

Conclusion: The prevalence of pneumonia among under-fives admitted at Kiryandongo Hospital was high at 15.9i%. This calls for urgent intervention. Numerous factors were established as predisposing these children to pneumonia such as early weaning, less adherence to immunization schedule as well as exposure to pollutants and going to crowded places like markets. Avoidance of these factors as well as educating caretakers about pneumonia, importance of immunization completion and adherence to exclusive breastfeeding practices will go a long way in drastically reducing prevalence.

CHAPTER ONE: INTRODUCTION

1.0 Background

Pneumonia is an infection of the lungs, caused by among other etiologies, bacteria or viruses. It is an infection of the lung parenchyma and is caused by a wide variety of organisms in pediatric patients. Anyone can be affected, but young children and the elderly are most susceptible. Pneumonia is almost often preceded and triggered by a cold or bout of flu (Harrison, 2010).

Pneumonia kills more children than any other illness, more than AIDS, malaria and measles combined. Over 2 million children die from pneumonia each year, accounting for almost 1 in 5 (20%) under five deaths worldwide. Yet, the disease is receiving less attention than it deserves (Victorian Department of Human Services, 2014).

The under-fives, being among the most vulnerable group, demand more attention and surveillance than is currently given. This is necessary if we are to reduce pneumonia mortality, a key step towards the achievement of the millennium development goal on child mortality.

There are studies that have suggested a close association among socioeconomic status, malnutrition and infectious diseases, especially pneumonia, leading to a vicious and silent course of disease especially in vulnerable children. There is evidence that goes both ways on a causal relationship between pneumonia and poor living conditions, the later frequently encountered in crowding settings, housing with inadequate water and sanitation, where children are repeatedly exposed to viral and bacterial infections. For instance, it has been irrefutably documented that children attending day-care centers are at higher risk of getting pneumonia(Thörn, Minamisava, Nouer, Ribeiro, & Andrade, 2011).

Prevalence of individual risk factors for bacterial pneumonia, including HIV-infection and severe malnutrition, may contribute to higher pneumonia burden in poorer communities and less developed countries(Theodoratou et al., 2014).

In regions where *Haemophilus influenzae* type b (Hib) vaccination coverage is low or has not been introduced, pneumonia cases are mainly due to Hib and *Streptococcus pneumoniae*. *S. pneumoniae* is the most common etiology of severe pneumonia and the leading cause of vaccine-preventable death in children less than five years of age (Roca et al., 2010).

It is in the backdrop of these facts that the researcher conducted this research on the incidence of and factors associated with community-acquired pneumonia among children under five attending Kiryandongo General Hospital between January and March 2019.

1.1. Problem statement

Pneumonia, as a disease that causes high mortality among the under-fives, a special group as far as the Millennium Development Goals (MDGs) are concerned, is not receiving the attention it calls for. It kills more children than HIV, malaria and measles combined and this, it does more in developing countries where the socio-economic status is low(Victorian Department of Human Services, 2014).

Developing countries, as signatories into the MDGs and vision 2030, agreed to put in place measures that will help reduce children mortality as part of achieving these two in the stipulated time scope (UNICEF, 2015).

Studies have shown an association between low socio-economic status, poverty and overcrowding, all of which plague most African countries, with prevalence of pneumonia (Thörn et al., 2011).

The increase in prevalence of pediatric pneumonia has also been attributed to the HIV/AIDS scourge which Africa, especially Uganda, has been fighting for decades (Theodoratou et al., 2014). Data on this subject is scarce, especially in Kiryandongo, where few studies, if any at all have been conducted concerning this.

It is for these reasons that the researcher felt justified to conduct a study on the prevalence, factors associated with, and the coexistence of HIV with community-acquired pneumonia among the under-fives, in Kiryandongo General Hospital, in Uganda.

1.2. Study objectives

1.2.1. Broad Objective

To determine the prevalence and factors associated with community-acquired pneumonia among the under-fives attending Kiryandongo General Hospital between January and March 2019.

1.2.2. Specific Objectives

1) To determine the prevalence of community-acquired pneumonia among the under-fives attending Kiryandongo General Hospital.

2) To identify the child-related and environmental factors associated with development of community-acquired pneumonia among the under-fives attending Kiryandongo General Hospital.
3) To determine incidence, morbidity and mortality of community-acquired pneumonia coexisting with HIV/AIDS infection among the under-fives attending Kiryandongo General Hospital.

1.3. Research Questions

1) What is the prevalence of community-acquired pneumonia among the under-fives attending Kiryandongo General Hospital?
2) What are the various child-related and environmental factors associated with development of pneumonia among the under-fives attending Kiryandongo General Hospital?
3) What is the incidence, morbidity and mortality of community-acquired pneumonia coexisting with HIV/AIDS exposure/infection among the under-fives attending Kiryandongo General Hospital?

1.4. Justification of the Study

Pneumonia kills more children than any other illness more than AIDS, malaria and measles combined. Over 2 million children die from pneumonia each year, accounting for almost 1 in 5 under five deaths worldwide. Yet, little attention is paid to this disease (Levine & Dinleyici, 2010).

Increased prevalence, morbidity, mortality among the under-fives has been escalated by the HIV/AIDS co-morbidity. Africa is the worst hit continent, compounded by low socio-economic status, poverty, overcrowding among others.

In Africa, Uganda is among the top countries worst hit by the HIV/AIDS pandemic (UNAIDS, 2016).

There is a proven association between increase in pediatric pneumonia prevalence and HIV coinfection and the prognosis of pneumonia is worse in HIV infected children as compared to their immunocompetent counterparts (Theodoratou et al., 2014).

All this unfavorable trend can be witnessed in Uganda, who as a signatory into the MDGs and Vision 2030, is supposed to reduce child mortality particularly in the under-fives. Data

obtained in the study will contribute immensely in offering the much needed information as to the current state affairs and which can be used by policy makers in decision making.

1.5. Study Scope

1.5.1. Geographical Scope

The study was carried out in Kiryandongo General Hospital, Kiryandongo District, Western Region of Uganda. It is a public general hospital founded in 1974 with 1 emergency department, bed capacity of 109. It is located on the Kampala – Gulu Highway, in Kikube Parish, Kiryandongo sub-county, Kibanda County in Kiryandongo District, about 50 Kilometres (31 mi), north-east of Masindi General Hospital. This is approximately 211 Kilometres (131 mi) north of the Mulago National Referral Hospital, the largest hospital in the country. The coordinates of the hospital are 01º52'46.0" N, 32º03'43.0" E.

It serves Kiryandongo District and parts of the Districts of Masindi, Nakasongola, Oya, Apac, Amuru and Nwoya.

1.5.2. Content Scope

The study dealt with determining the prevalence and factors associated with community-acquired pneumonia among the under-fives in Kiryandongo General Hospital.

1.5.3. Time scope

The study was conducted from January 2019 to March 2019, a prevalence period of 3 months.

1.6. Conceptual Framework

The incidence of community-acquired pneumonia among the under-fives (dependent variable) was thought to be influenced by a number of factors (independent variables) the chief being poverty, overcrowding, caregiver's education, father's education, employment of parents, malnutrition and immune status of the child. Other factors that increase prevalence include institutionalization or having siblings attending day-care facilities.

Factors that would be protective included full immunization, proper nutrition, and proper housing.

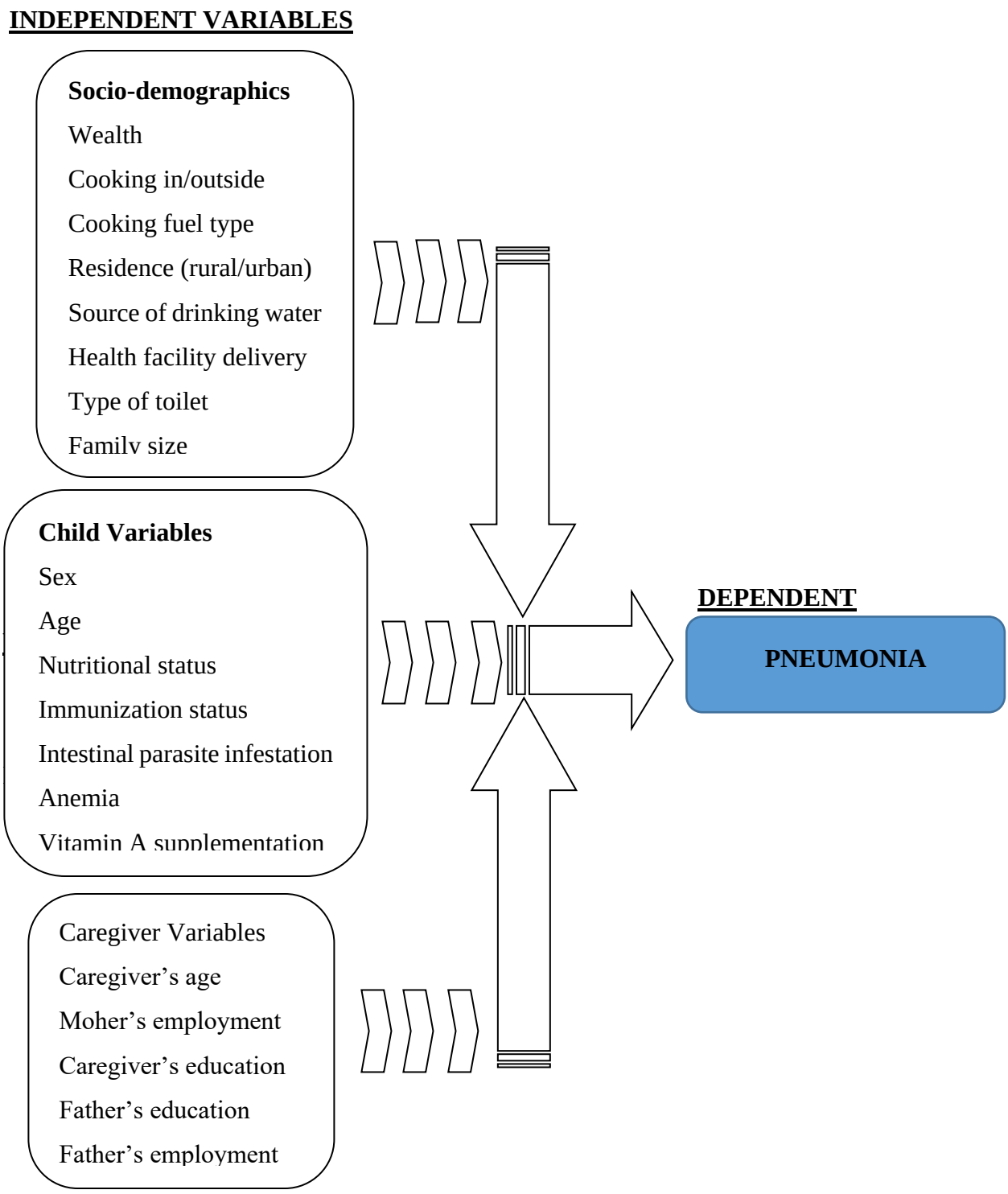

Figure 1: Conceptual framework on Factors Associated with Pneumonia among The under-fives, Courtesy of: Harerimana et al, Archives of Public Health (2016) 74:19

CHAPTER TWO: LITERATURE REVIEW

2.0. Introduction

This chapter deals with various literature reviewed on the incidence and factors associated with community-acquired pneumonia among children under five.

2.1. Prevalence of Pneumonia among the under-fives

According to WHO and Maternal & Child Epidemiology Estimation group, pneumonia remains the leading infectious cause of death among children under five, killing 2,500 children a day. Pneumonia accounts for 15% of under-five deaths and killed 920,000 children in 2015. Most of the victims were less than 2 years old (MCEE), 2015).

In 2015, community acquired pneumonia (CAP) accounted for 15% of deaths in children under 5 years old globally and 922 000 deaths globally in children of all ages (Haq, Battersby, Eastham, & McKean, 2017).

The Centers for Disease Control and Prevention (CDC) conducted an Etiology of Pneumonia in the Community (EPIC) study, which was a prospective, multicenter, population-based, active-surveillance study. It involved systematic enrollment and diagnosis to determine the incidence and microbiologic causes of community-acquired pneumonia requiring hospitalization among U.S. children. The study was conducted in the United States of America (USA) from January 2010 through June 2012, that enrolled 2638 of 3803 eligible children (69%) and it was found out that 2358 (89%) had radiographic evidence of pneumonia. The median age of the children was 2 years (interquartile range, 1 to 6); 497 of 2358 children (21%) required intensive care, and 3 (<1%) died. Among 2222 children with radiographic evidence of pneumonia and with specimens available for bacterial and viral testing, a viral or bacterial pathogen was detected in 1802 (81%), one or more viruses in 1472 (66%), bacteria in 175 (8%), and both bacterial and viral pathogens in 155 (7%). The annual incidence of pneumonia was 15.7 cases per 10,000 children, with the highest rate among children younger than 2 years of age (62.2 cases per 10,000 children; 57.6 to 67.1). Respiratory syncytial virus was more common among children younger than 5 years of age than among older children (37% vs. 8%), as were adenovirus (15% vs. 3%) and human metapneumovirus (15% vs. 8%). Mycoplasma pneumoniae was more common among children 5 years of age or older than among younger children (19% vs. 3%). The study

concluded that the burden of hospitalization for children with community-acquired pneumonia was highest among the very young, with respiratory viruses the most commonly detected causes of pneumonia (Jain et al., 2015).

In Mali, a study conducted on an overall of 118 pneumonia cases showed that 44.1% were female, median age was 11 months. Among pneumonia cases, 30.5% were hypoxemic at admission, mortality was 4.2%. Pneumonia in these children was mainly attributed to S. pneumoniae, RSV, human metapneumovirus, and influenza A virus (Bénet, Sylla, Messaoudi, & Picot, 2015).

In a study by Doreen and colleagues they found that the prevalence of pneumonia in children in Mukono District in Uganda was 13.9% (Tuhebwe, Tumushabe, Leontsini, & Wanyenze, 2014). In 2013 in Mulago Hospital among 614 children under the age of five 27.2% (95% CI: 23.7–30.9) had bacterial pneumonia, 26.5% (95% CI: 23.1–30.2) had viral pneumonia (Nantanda, Tumwine, Ndeezi, & Ostergaard, 2013).

2.2 Factors Associated with Community-Acquired Pneumonia among the Under-Fives

There are studies that have suggested a close association among socioeconomic status, malnutrition and infectious diseases, especially pneumonia, leading to a vicious and silent course of disease especially in vulnerable children. There is evidence that goes both ways on a causal relationship between pneumonia and poor living conditions, the later frequently encountered in crowding settings, housing with inadequate water and sanitation, where children are repeatedly exposed to viral and bacterial infections. For instance, it has been irrefutably documented that children attending day-care centers are at higher risk of getting pneumonia (Thörn et al., 2011).

A study in Brazil found that between 2007 and 2009 in infants, the risk of developing pneumonia was inversely associated with the head of household income and with the caregiver's educational level. Areas with deprived socioeconomic conditions had higher incidence of pneumonia and needed to be targeted more in terms of vaccination coverage (Thörn et al., 2011).

In Mozambique, severe pneumonia episodes were witnessed among children <2 years of age admitted to a rural hospital in Manhiça. Study children were tested for HIV during the second

year of surveillance. Severe pneumonia accounted for 15% of 5132 hospital admissions and 32% of in-hospital mortality among children <2 years of age. Also, 43% of chest radiographs were interpreted as radiologically confirmed pneumonia. HIV-infection was associated with 81% of fatal pneumonia episodes among children tested for HIV. The minimum incidence rate of radiologically confirmed pneumonia requiring hospitalization was 19 episodes/1000 child-years. Incidence rates among HIV-infected children were 9.3-19.0-fold higher than HIV-uninfected (Roca et al., 2010).

In Benin City, Nigeria a study associated high prevalence of Congenital Heart Disease (CHD) in children with pneumonia, and therefore recommended evaluation of children with pneumonia for CHD (Sadoh & Osarogiagbon, 2013).

In Rwanda in 2010, study showed that child's age, anemia level, and receipt of Vitamin A; household toilet type and residence, and season of interview were independent factors associated with pneumonia in children. In multivariate regression, being in the bottom ten percent of households or being interviewed during the rainy season was positively associated with acute lower respiratory infections, while urban residence and being age 24–59 months versus 0–11 months was negatively associated with acute lower respiratory infections (Harerimana, Nyirazinyoye, Thomson, & Ntaganira, 2016).

Onyango et al carried a study in Kenya on pneumonia in children which documented that the median age of cases was 14.0 (Range 3-58). They went further to state that comorbidity, delay in seeking treatment for three days or more and contact with upper respiratory tract infection were independent risk factors for severe pneumonia. Receiving antibiotics at home seemed to be protective (Dickens Onyango, Gideon Kikuvi, Evans Amukoye, 2012).

2.3. Incidence, Morbidity and Mortality of Community-Acquired Pneumonia coexisting with HIV/AIDS

A global study conducted in 2010 showed that underlying HIV infection is an important risk factor for pneumonia morbidity and mortality in children. The odds ratio (OR) for hospital admission for all-cause pneumonia in HIV-infected children compared with HIV-uninfected children was 6·5 (95% CI 5·9–7·2). The risk of death was higher in children with pneumonia and HIV compared with those with pneumonia only (OR 5·9, 95% CI 2·7–12·7). In 2010, 1·4 million pneumonia episodes (uncertainty range [UR] 0·6 million to 3·3 million) and 88

000 pneumonia deaths (UR 47 400–153 000) occurred in HIV-infected children in low-income countries. Of these, 1·2 million pneumonia episodes (UR 0·5 million–2·7 million) and 85 400 deaths (UR 46 000–147 300) were directly attributable to HIV. 1·3 million (90%) pneumonia episodes and 82 400 (93%) pneumonia deaths in HIV-infected children aged younger than 5 years occurred in the WHO African region. It concluded that globally, a small proportion of pneumonia episodes and pneumonia deaths occur in HIV-infected children. However, in the highest HIV-burden countries in sub-Saharan Africa (i.e., Swaziland, Lesotho, and Zimbabwe) up to a fifth of all pneumonia cases and 60% of pneumonia deaths occur in HIV-infected children. (Theodoratou et al., 2014).

A study conducted in 2014, among 43 hospitals in sub-Saharan Africa on the incidence of readmissions indicated that readmissions are common after hospitalization for pneumonia, especially among young children and those with chronic medical conditions such as HIV/AIDS (Neuman et al., 2014).

CHAPTER THREE: METHODOLOGY

3.0. Introduction

This chapter deals with the different tools used in population selection and sampling, study design, data handling, analysis and presentation plus all other determinants of study feasibility.

3.1. Study design

A cross sectional descriptive study that utilized both qualitative and quantitative data was used in the study.

3.2. Study area

The study area was pediatric wards of Kiryandongo General Hospital, in Kiryandongo District, Uganda.

3.3. Study population

The study population was comprised of children under five years admitted at Kiryandongo General Hospital between January and March 2019.

3.4. Eligibility criteria

3.4.1. Inclusion criteria

The study included all children under five years old admitted at Kiryandongo General Hospital with a diagnosis of community-acquired pneumonia during the study period whose caretakers consented.

3.4.2. Exclusion criteria

Any child above five years admitted at Kiryandongo General Hospital, or under-five with a diagnosis other than community acquired pneumonia or who was eligible to participate but whose caretaker failed to consent was excluded from participating.

3.5. Sample size and sampling technique

3.5.1. Sample size

The sample size was determined using Fishers et al., 2006 formula to estimate the proportion of the under-fives with community-acquired pneumonia. i.e. $N=Z^2PQ/D^2$:

Where,

N was the desired sample size

Z was the standard normal deviation taken as 2.0 at a confidence interval of 95%.

P was the proportion of the under-fives estimated to have community-acquired pneumonia = 16.4% (estimated from UBOS, 2015)

D was the degree of accuracy= 0.05.

Q= (1-P) which was the population without community-acquired pneumonia.

Therefore, $N= 2.0^2 X 0.164 (1-0.164) / (0.05)^2 = 219$

220 was the sample size.

3.5.2 Sampling technique

Consecutive sampling technique was used where participants were recruited as per their satisfaction of the inclusion criteria until the desired sample size was obtained.

3.6. Data collection method

Both primary and secondary data was utilized for the study. Primary data was collected in the form of a researcher-administered questionnaire that had been appropriately structured as to meet the objectives of the study. Secondary data was obtained from doctors' records in patients' files for diagnosis and laboratory findings on probable aetiology.

3.7. Data analysis

Data was entered into Microsoft excel 2016 spreadsheets and analyzed using SPSS version 19.0. Descriptive statistics were performed using absolute numbers, percentages, ranges and measures of central tendency accordingly. Data was presented in tables, graphs and charts using MS PowerPoint.

3.8. Ethical consideration

Written introductory letter from KIU-TRH with approval was sought and presented to the concerned authorities at Kiryandongo General Hospital. Informed consent from the respondents was also obtained both verbally and in writing. Participants were assured of confidentiality and use of the information obtained only for the purpose of the research. Participation was fully out of the respondents' volition and they reserved the right to or not to participate, or to pull out at any time, whenever they no longer felt comfortable to continue. Their choice to either participate or not bore no repercussions whatsoever in terms of benefits or otherwise and did not in any way affect the services that they were entitled to from Kiryandongo General Hospital and its staff.

3.9. Study limitations

All study limitations that had been foreseen were handled accordingly such as language barrier was tackled through the recruitment of research assistants conversant with the local language. Financial limitations were handled through stringent budgeting and sourcing for assistance from family, friends and well-wishers.

3.10. Dissemination of results

The copies of the dissertation were distributed to faculty of clinical medicine and Dentistry as well as Kampala International University Library, E- lab, KGH, and one copy was kept for personal reference.

CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION

4.0. INTRODUCTION

This chapter deals with the analysis of data and presents them as per objective and in the form of narratives, tables, charts and graphs.

4.1. Demographic Characteristics

A total of 220 caregivers with their under-fives took part in the study. A total of 220 questionnaires were administered, the same number received and analyzed, giving a response rate of 100%.

4.1.1. Education Level of Primary Caregiver

EDUCATION LEVEL	NUMBER OF CAREGIVERS	PERCENTAGE (%)
Primary	105	47.7
Secondary	34	15.4
Tertiary	9	4.1
None	72	32.8
TOTAL	**220**	**100**

Table 1: Primary Caregiver's Education Level (N=220)

As shown in Table 1 above, majority of the primary caregivers had only attained a primary level of education. 105 (47.7%) had completed primary, 34 (15.4%) secondary, 9 (4.1%) tertiary while 72 (32.8%) had never gone to school.

4.1.2. Occupation of Primary Caregiver

OCCUPATION	NUMBER OF CAREGIVERS	PERCENTAGE (%)
Peasant	109	49.7
Housewife	78	35.4
Business person	27	12.3
Student	6	2.6
TOTAL	**220**	**100**

Table 2: Primary Caregiver's Occupation (220)

As from Table 2 above, peasants (49.7%) made the largest proportion of the under-fives' caregivers followed by housewives (35.4%), then business persons (12.3%) and lastly students (2.6%).

4.1.3. Marital Status of the Primary Caregiver

As show in Table 3 below, most (73.8%) of the primary caregivers were married, followed by the single (19.5%) and lastly the widowed (6.7%). There were no divorcees among the primary caregivers.

MARITAL STATUS	NUMBER OF CAREGIVERS	PERCENTAGE (%)
Married	162	73.8
Single	43	19.5
Widowed	15	6.7
Divorced	0	0
TOTALS	220	100

Table 3: Caregiver's Marital Status (N=220)

4.1.4. Occupation of Father

OCCUPATION	NUMBER OF FATHERS	PERCENTAGE (%)
Peasant	81	49.7
Mason	57	35.4
Businessman	20	12.3
Student	4	2.6
TOTALS	**162**	**100**

Table 4: Occupation of Father (N=162)

A total of 162 under-fives had their fathers who were married and who played an active role in their care. As shown in Table 4 above, most of the fathers were peasants just like the primary caregivers. Peasants made 49.7%, masons 35.4%, businessmen 12.3% and students 2.6% of the fathers.

4.2. Prevalence of Pneumonia among Under-five Children

Out of the total 220 children that took part in the study, the sex distribution was 149 (67.73%) males and 71(32.27%) females. Out of these, 35 had a primary diagnosis of community acquired pneumonia giving a prevalence of 15.91%.

4.2.1. Child-related Factors and Community-Acquired Pneumonia

4.2.1.1. Sex Distribution of Under-five Pneumonia Cases

The distribution of community-acquired pneumonia by sex was as shown in figure 2 below.

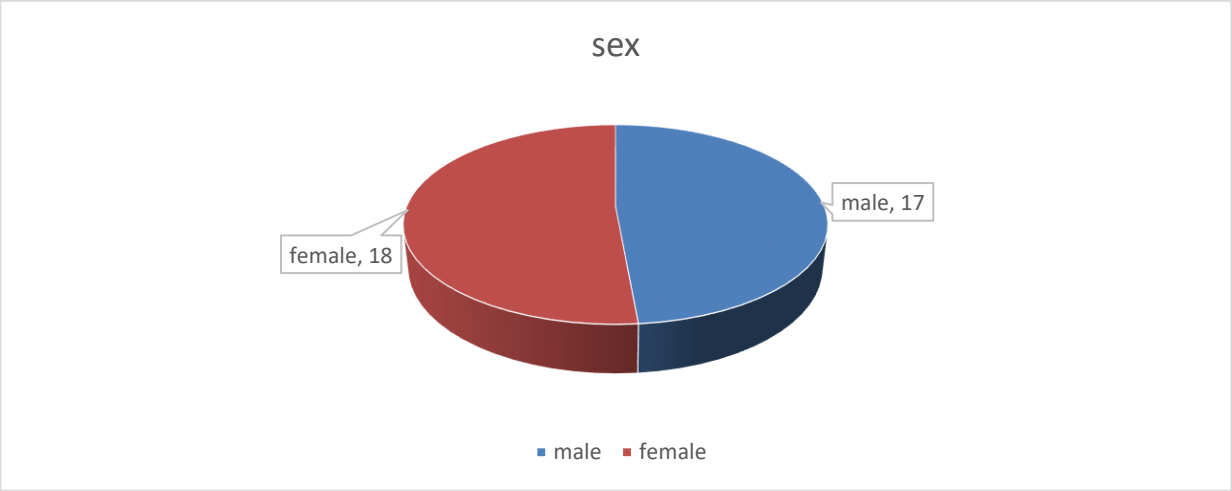

Figure 2: Prevalence of Community-acquired Pneumonia by Sex (N=35)

51.43% (18) of the participants with a primary diagnosis of pneumonia were females whereas 48.57% (17) were males. The male child had less than half the girl child's odds of having community-acquired pneumonia (OR: 0.38).

4.2.1.2. Prevalence of Community-acquired Pneumonia by Age

Age group (years)	***Total number***	***Pneumonia cases***	***Percentage (%)***
Less than 1 year	22	6	27.3
1 but less than 2	38	10	26.3
2 but less than 3	45	9	20.0
3 but less than 4	40	4	10.0
4 but less than 5	75	6	8.0
TOTAL	**220**	**35**	

Table 5: Community-acquired Pneumonia Prevalence by Age (N=220)

From table 5 above, the number of pneumonia cases in the age group of zero to one year were six (27.3%). The number of pneumonia cases from one to two years were ten (26.3%), while from two years to three years nine (20%) children were found to have pneumonia. The number of cases of pneumonia from three to four years were four (10%), while among the four to five year olds, six (8.0%) had pneumonia. It is seen that the 1-2 year olds contributed the largest number (10, 26.3%) of the pneumonia cases. However, no statistically significance could be found between age and prevalence of community-acquired pneumonia among the under-fives (p-value 0.9128, C.I. 95%).

4.2.1.3. Child Immunization History and Community-Acquired Pneumonia

In total, 186 under-fives had a satisfactory immunization history while 34 lacked a good immunization history. Out of the children with pneumonia in the study, 36.9% (13) had not received immunization for their appropriate ages while 22 had. This is shown in Table below.

IMMUNIZATION	**PNEUMONIA +VE**	**PNEUMONIA -VE**	**TOTAL**
Satisfactory	22	164	186
Unsatisfactory	13	21	34
TOTALS	**35**	**185**	**220**

Table 6: Child Immunization History and Community-Acquired Pneumonia (N=220)

Child immunization appeared protective against community-acquired pneumonia among the under-fives. The odds of pneumonia were reduced by more than half among the immunized compared to the non-immunized (OR: 0.22).

4.2.1.4. Breastfeeding History and Community-Acquired Pneumonia

In total, 143 under-fives had a good exclusive-breastfeeding history while 77 had a poor history. Out of those diagnosed with community-acquired pneumonia, 18 had exclusively breastfed while 17 had not. Figure 3 below shows that information clearly.

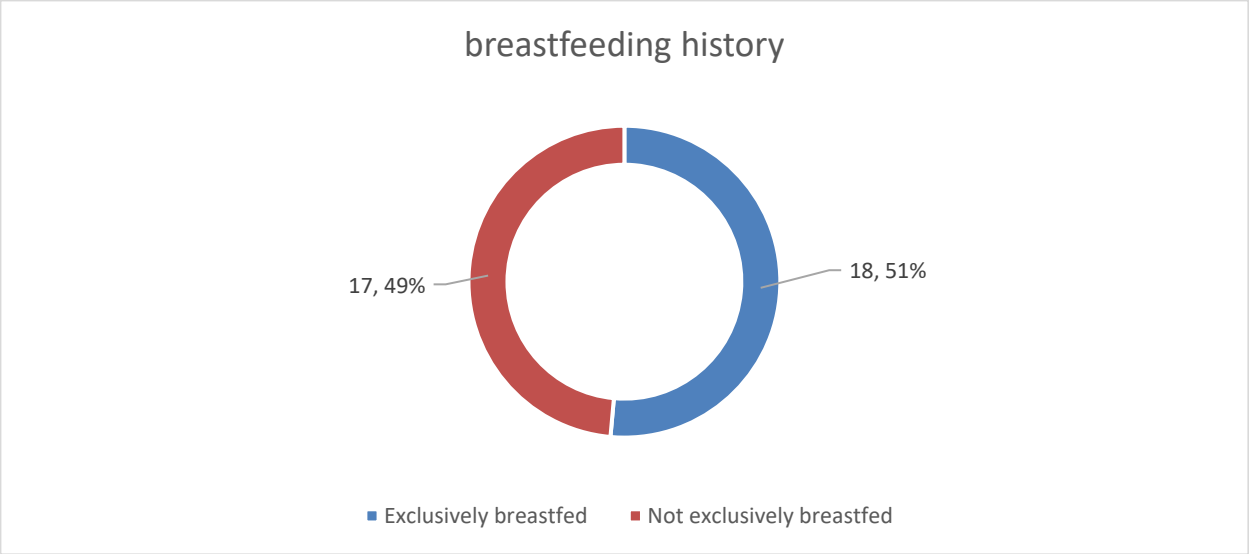

Figure 3: Breastfeeding History and Community-Acquired Pneumonia (N=35)

Despite the exclusively breastfed making a large proportion of the pneumonia diagnoses (51%), exclusive breastfeeding was found to be protective against community-acquired pneumonia among the under-fives. The odds of pneumonia among under-fives was almost doubled among the non-exclusively breastfed compared to those exclusively breastfed (OR: 1.98)

4.2.1.5. Nutritional Status and Community-Acquired Pneumonia

24 (68.57%) of the pneumonia diagnoses had some degree of malnutrition, 16 (45.71%) moderately and 8 (22.86%) severely. Only 11 were found to be of good nutrition.

4.3. Environmental Factors and Community-Acquired Pneumonia

4.3.1. Prevalence of Community-acquired Pneumonia by Residence

RESIDENCE	**PNEUMONIA**	**NO PNEUMONIA**	**TOTALS**
Rural	27	157	184
Urban	8	28	36
TOTAL	**35**	**185**	**220**

Table 7: Comparison of Community-acquired Pneumonia Between Rural & Urban Dwellers (N=220)

27 (77%) of the pneumonia cases came from rural setting and only 8 cases hailed from an urban setup. Despite the contribution by rural under-five children being higher to the

pneumonia cases, it is actually the rural under-fives that had increased odds of community-acquired pneumonia. The odds of community acquired pneumonia among the urban under-fives was more than half the odds among the rural under-fives (OR: 1.66).

4.3.2. Environmental Elements and Community-Acquired Pneumonia

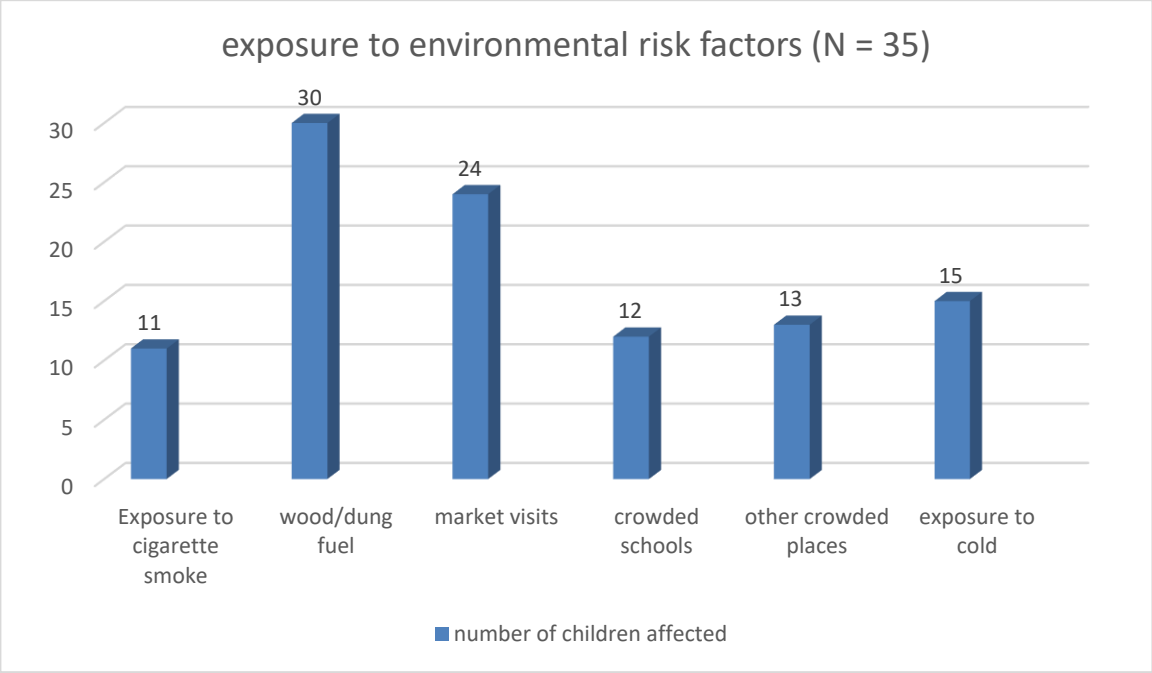

Figure 4: Environmental Factors Associated with Community-Acquired Pneumonia (N=35)

About half of the total under-fives (105, 47.73%) had been exposed to the known risk factors for pneumonia. 85.7% (30) of the children with community-acquired pneumonia lived in households that used wood or dung for cooking while 31.4% (11) had been exposed to a family member that smoked. 68.6% (24) were exposed to market environments, while 37.1% (13) had been exposed to other crowded places. Another 34.3% (12) of children attended crowded schools. A staggering 42.9% (15) spent most of the day without clothes and exposed to the cold and especially in the evening. The risk factors found significantly common among all the cases were source of fuel, exposure to market environments and exposure to cold.

4.4. Pneumonia Coexistent with HIV infection in children

Out of the 35 pneumonia cases, 26 (74.29%) were HIV negative, 9 (25.71%) were either HIV positive or HIV exposed. This is shown in Figure 5 below.

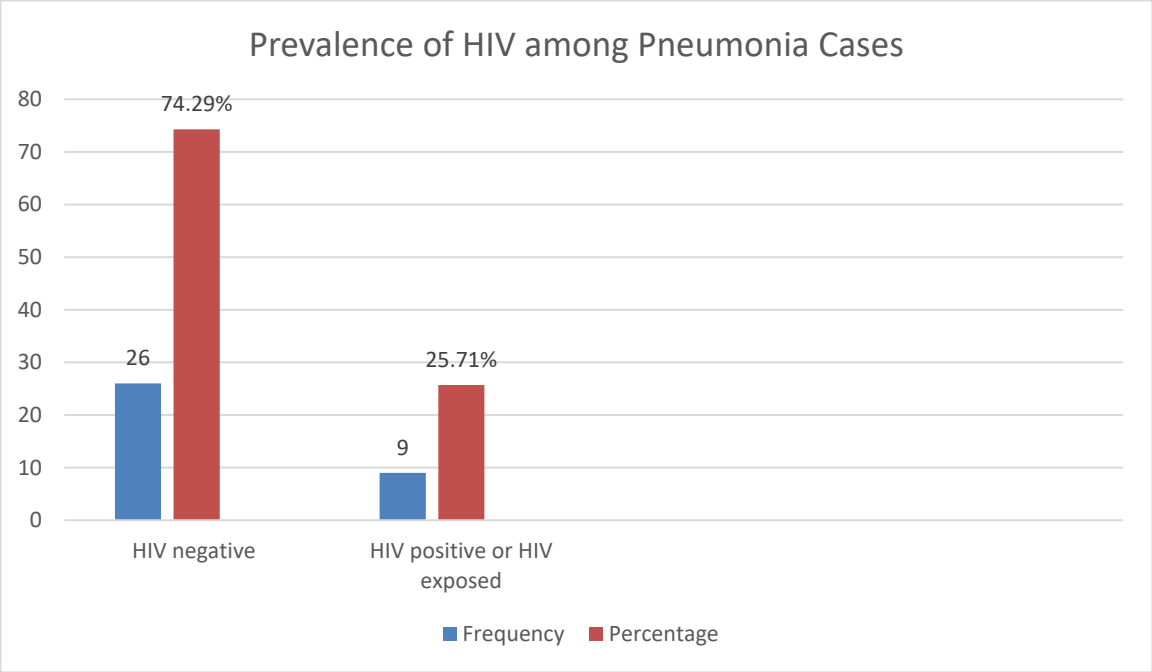

Figure 5: HIV Diagnoses Among Under-fives with Community-Acquired Pneumonia (N=35)

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0. Introduction

This chapter presents the discussions of the study findings as per objective, the recommendations made and conclusions derived.

5.1. Discussion of Study Findings

5.1.1 Prevalence of Pneumonia

The prevalence of community-acquired pneumonia among the under-fives at Kiryandongo General Hospital (KGH) was high at 15.91%. This could be attributable to some child-related and environmental factors such as poor immunization, poor adherence to exclusive breastfeeding, HIV coinfection and exposure to air pollution, especially in the urban areas, that were found significant in the study.

These findings agree with the WHO reports that pneumonia still remains the leading infectious cause of morbidity and mortality among under-fives ((MCEE), 2015). They also replicate the reports by (Haq et al., 2017) and (Jain et al., 2015) re-emphasizing the heavy burden caused by community-acquired pneumonia.

More importantly though, these findings call for urgent interventional measures as the high prevalence rates reported by (Nantanda et al., 2013), and (Tuhebwe et al., 2014) in Mulago and Mukono Districts in Uganda are far from improved. The prevalence rates of community-acquired pneumonia in these two studies were 26.5% and 13.9% respectively.

5.1.2. Factors Associated with Pneumonia among the Under-fives

Child sex, immunization history, breastfeeding history and residence were found to be significantly associated with community-acquired pneumonia among the under-fives.

Male sex (OR: 0.38) and child immunization (OR: 0.22) were found to be protective while poor adherence to exclusive breastfeeding (OR: 1.98) and urban residence (OR: 1.66) were found to increase the risk. No significant association was found between child's age and prevalence of community-acquired pneumonia (p-value 0.9128, C.I. 95%). A history of exposure to cigarette smoke, use of firewood or dung as a fuel source, exposure to crowded public places such as markets and schools and frequent exposure to cold weather were also reported by most of the pneumonia cases.

While these results tend to agree with reports from other studies conducted previously, there are some aspects of some results that this one tend to disagree with. For instance, on the aspect of child's age, these results disagree with reports by (Roca et al., 2010) in Mozambique who found age a significant factor. It also disagrees with (Harerimana et al., 2016) who also reported child's age significant in community-acquired pneumonia among Rwanda's under-fives. However, there is some agreement on the aspect of residence as significant; urban residence was shown to increase the risk of community-acquired pneumonia among under-fives in both these studies.

The issue of comorbidity and under-five pneumonia, this study agrees with (Dickens Onyango, Gideon Kikuvi, Evans Amukoye, 2012) since the prevalence of HIV coinfection among the pneumonia cases in this study was found to be high (25.71%).

5.1.3 Presence of comorbidities and Pneumonia Prevalence

There was a significant association between HIV infection and pneumonia prevalence among the under-fives. The prevalence was 25.71% with 9 out of the 35 pneumonia cases found to be either HIV exposed or HIV positive. Pneumonia was also associated with poor nutrition and was directly associated with severity. Among the pneumonia cases, 68.57% were found to be having some degree of malnutrition. 16 (47.71%) had moderate malnutrition and 8 (22.86%) had severe malnutrition. Poor nutrition with lack of Zinc, Vitamin A, Vitamin D, Vitamin E and other micro-elements have been shown to increase respiratory tract infections (Trandafir, Boiculese, Dimitriu, & Moscalu, 2017).

These findings agree with the results of the global study conducted in 2010 by Theodoratou that showed that underlying HIV infection is an important risk factor for pneumonia morbidity and mortality in children. The results also echo those of a study in 2014, among 43 hospitals in sub-Saharan Africa on the incidence of readmissions that indicated that readmissions are common after hospitalization for pneumonia, especially among young children and those with chronic medical conditions such as HIV/AIDS (Neuman et al., 2014). A lowered immune status predisposes one to infections especially pneumonia by even organisms that are normal residents of the respiratory system that would not normally cause any problem.

5.2. Conclusions

The prevalence of pneumonia in children aged five years and below attending Kiryandongo General Hospital at the time of study was 15.91%. Numerous factors were established as predisposing these children to pneumonia such as early weaning with malnutrition, less adherence to immunization schedule, HIV co-infection as well as exposure to smoke and going to crowded places like markets. Avoidance of these factors as well as educating caretakers about pneumonia will drastically reduce its prevalence.

5.3. Recommendations

From the study findings, the researcher was able to come with the following recommendations.

5.3.1. To the caregivers of under-fives

They should adhere to exclusive breastfeeding of their under-fives for the recommended six months and the set immunization schedules given the health benefits that has been proved to confer to children in terms of fighting infections and disease. They should also minimize exposure of the children to all sorts of pollution such as cigarette smoke, urban pollution and smoke from wood and dung. In as much as possible, they should also endeavor exposing their children to crowded places.

5.3.2. To the Staff and Management of Kiryandongo General Hospital

Revamp health education on the importance of child immunization and adherence to exclusive breastfeeding. Exclusive breastfeeding, as an element component of the elimination of mother to child transmission of HIV/AIDS (eMTCT), will go a long way in reducing the high prevalence of HIV seen among these children.

5.3.4. To Fellow Researchers

This study dwelt chiefly on the child-related and environmental factors associated with community-acquired pneumonia among under-fives. The factors discussed here are far from exhaustive! There are other factors such as socio-economic status that studies have shown to influence disease patterns. Studies conducted on these factors will go a long way in furnishing the much needed information that will inform appropriate interventions. The issue of significance of age and prevalence of pneumonia disagreed with other studies conducted

previously. More studies can be conducted on this so as to provide tie-breakers through eliciting the true state of affairs.

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APPENDICES

APPENDIX I: CONSENT FORM

STUDY TITLE: PREVALENCE AND FACTORS ASSOCIATED WITH COMMUNITY-ACQUIRED PNEUMONIA AMONG UNDER-FIVES ADMITTED AT KIRYANDONGO GENERAL HOSPITAL.

I have read and understood the research topic above on the planned study and the explanations given to me. I understand what I have been requested to do in respect to this study. I have asked questions and gotten clarifications about the study and I am satisfied. I have, after due consideration, willingly consented to take part in this study as explained.

Participant's signature …… Date ……

Investigators name …… Signature ……

Date ……

APPENDIX II: QUESTIONNAIRE

SECTION A: DEMOGRAPHIC DATA

SERIAL NO: …….

INTRODUCTION

STUDY TITLE: PREVALENCE AND FACTORS ASSOCIATED WITH COMMUNITY-ACQUIRED PNEUMONIA AMONG UNDER-FIVES ADMITTED AT KIRYANDONGO GENERAL HOSPITAL.

CONFIDENTIALITY: I am **ADONGAKULU EMMA BONGANI**, a final year medical student at Kampala International University – Western Campus carrying out the above research. I would hereby wish to assure you that the information you will provide will be accorded the confidentiality it deserves and will not be used for purposes other than those meant for this research. Therefore, feel free.

DEMOGRAPHIC DATA

AGE CAREGIVER ……..

RELIGION (Name appropriate) …….……

MARITAL STATUS
- SINGLE ☐
- DIVORCED ☐
- MARRIED ☐
- WIDOWED ☐
- SEPARATED ☐

EDUCATION STATUS
- NO FORMAL EDUCATION ☐
- PRIMARY ☐
- SECONDARY ☐
- POST SECONDARY ☐

EDUCATION STATUS OF PARTNER (If applicable)
- NO FORMAL EDUCATION ☐
- PRIMARY ☐
- SECONDARY ☐

OCCUPATION
- FORMAL EMPLOYMENT ☐
- ☐
- ☐

Specify

……..……...

NOT FORMALLY EMPLOY

Specify

…….

OCCUPATION OF PARTNER (If applicable) FORMAL EMPLOYMENT

Specify

…….

NO FORMAL EMPLOYMENT

Specify

…….

CHILD'S DETAILS,

a) Sex: Ma Fem

b) Age of child:

0 -1 ye 1-2 ye 2-3 y 3-4 years

4-5 ye

MAIN SECTION

1. RESIDENCE Permane Semi-Perma Temp

Describe further ……

a) Is it in an urban or rural area?
……..

b) Number of rooms
……

c) How many family members live in the household……..…?

d) Do you have a separate structure that you use as a kitchen/for cooking ……...…?

e) What type of fuel do you use for cooking?

Firew ☐ Char ☐ Ker ☐ Cow ☐

Gas ☐ Other (specify) ……..

2. How many children do you have? ……..

Please list them from the eldest to the youngest

……

……

……

……

a) How many are attending school? ……..……

b) Is there any other child in the family with similar symptoms as to this whether at present or in the near past?

YE ☐ N ☐

c) What is the distance from your place of residence to the nearest health facility? ……

…...….

3. Is there any immediate family member with any chronic condition?

YES ☐ NO ☐

If yes, please elaborate ……..... ……

4. Where did you deliver this particular child?

HO ☐ HEALTH FACILITY ☐

If from home, who assisted you? …….

5. Were there any complications during pregnancy, delivery or after especially with the baby? ☐ ☐

If yes, please explain further …….

……

……

6. Has your child received all the immunizations scheduled? Yes ☐ No ☐
7. Did you breastfeed your child exclusively for 6months? Yes ☐ No ☐
8. Does your child have any history of choking or coughing when feeding?

   ☐ Yes ☐

   No ☐
9. Does anyone at home smoke? ☐ No
10. Does your child spend any period of time uncovered or without clothes?

    ☐ ☐

    (If yes specify how long and what part of the day……)
11. Where do you get your drinking water?

    ……..
12. What type of toilet do you have?

    Modern flush type ☐

    VIP latrine ☐

    Traditional pit latrine ☐

    None ☐
13. Do you take your child to any of the following places?

    Market ☐ ☐

    School ☐ ☐

    Crowded places ☐ ☐

    Daycare centers Yes ☐ No ☐
14. Important nutrition Assessment findings

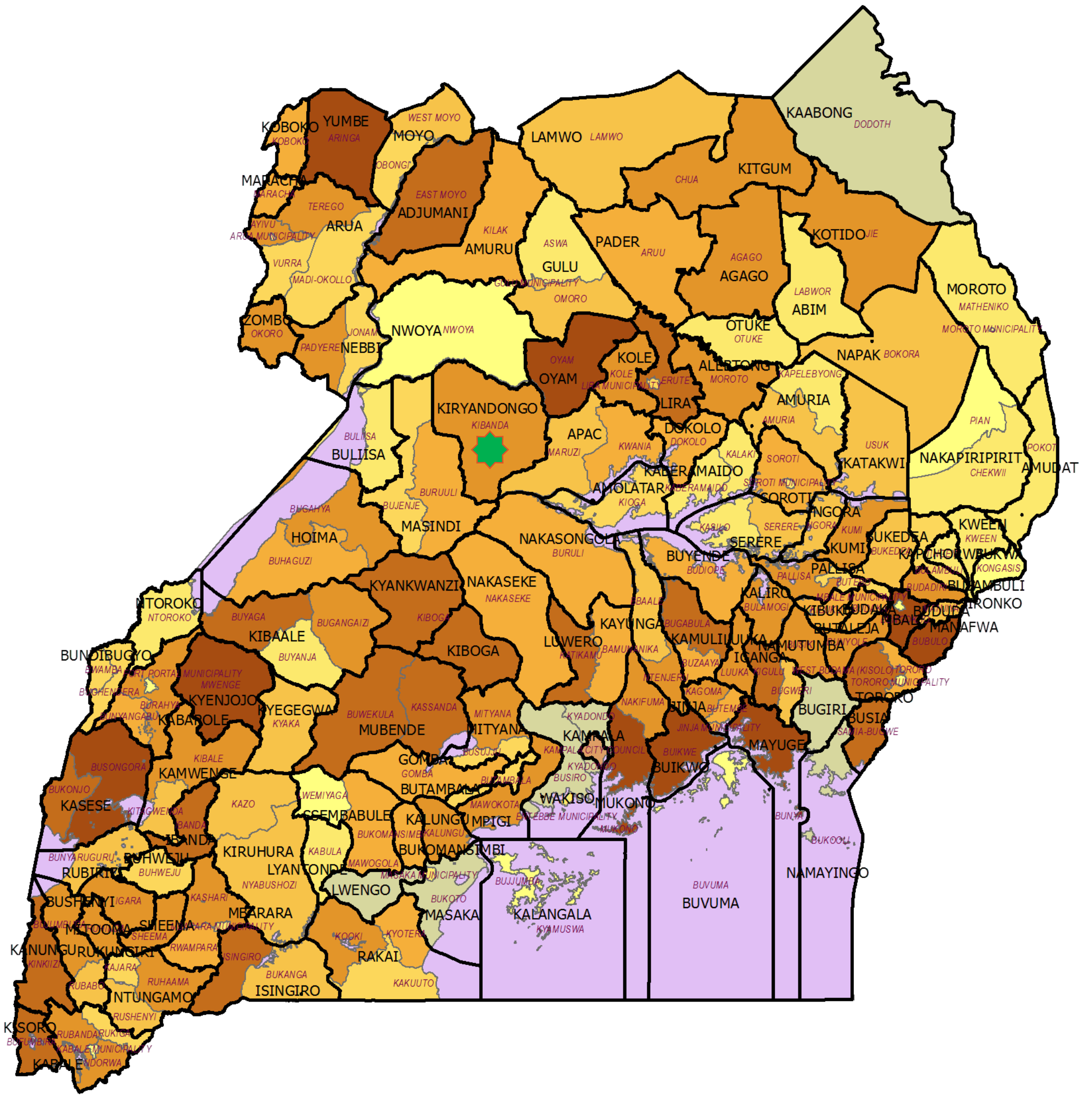
    Weight for age Normal ☐ Underwe ☐

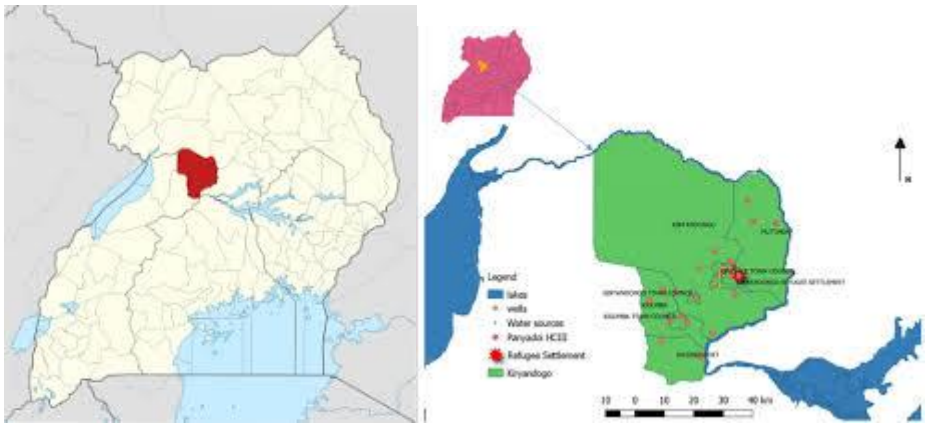
    Height for age No ☐ Stunted ☐

    Weight for height No ☐ Wasted ☐

THANK YOU

APPENDIX III: MAP OF UGANDA SHOWING LOCATION OF KIRYANDONGO DISTRICT




Legend
lakes
wells
Water sources
Panyada HCIII
Refugee Settlement
Kiryandongo
10 0 10 20 30 40 km